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ODP COMPUTER

SYSTEM PLAN

FOR FY78 THROUGH FY80

5 AUGUST 1977

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REFERENCES

1. ODP Planning Staff Paper: CIP Requirements, FY77-83
   To be published in August 1977

2. Memorandum From: [redacted] 25X1A
   Acting Chief, DDC/ISS
   To : Director of Data Processing,DDA
   Subject : Summary of Computer Facility Resource Requirements for ISS Information Systems
   Dated : 2 March 1977

3. Memorandum From: [redacted] 25X1A
   To : Director of Data Processing
   Subject : ADP Resource Requirements for FY 1977-1982
   Dated : 23 November 1976

I INTRODUCTION

This paper describes the Office of Data Processing (ODP) Plan for existing and projected computer systems and networks in the Ruffing and Special Centers for fiscal years 1978, 79, and 80. The implementation of this plan will fulfill all known ODP requirements through at least FY80 with the exception of the CAMS Service. A detailed plan for the CAMS Service must be postponed until clarification of both CAMS requirements and funding can be obtained. Chapter VI, the Special Center Implementation Plan, discusses the present CAMS Service in more detail.

Throughout this plan, frequent reference is made to particular units of equipment (e.g. IBM 3350 disk drives, COMTEN 3670 front-end processors). In some cases these references apply to equipment already installed, in others they refer to equipment to be acquired to fulfill future requirements. In those cases where new equipment is to be acquired, the specific hardware designation is provided to illustrate the type and capability of the equipment required. The actual equipment will be aquired through the RFP process whenever possible and will represent the most cost effective alternative available to meet a given requirement.

This plan was developed using the following guidelines:

A) Provide a plan compatable with known budget, personnel and physical space constraints.

B) Provide for improved availability and reliability to the user community.

C) Provide for a smooth transition of all services in an environment of software and hardware change.

D) Provide a plan that uses the most cost effective means of fulfilling our known requirements.

The major goals of this plan are as follows:

A) Expand the capacity of the VM Service before the workload exceeds current capacity which would cause poor response to all VM users.

B) Increase the availability of the VM and GIM Services from the current level of 94% to 98%.

C) Complete the migration of all services to 370 type CPUs and the more reliable and secure VM and MVS environments.

D) Provide adequate capacity for the expanding requirements in both the Ruffing and Special Centers.

The next chapter of this paper presents an overview of the major components of this plan. Three topics are discussed; the Ruffing Center implementation, the Special Center implementation and a general discussion of availability. Chapter III addresses ODP's requirements by major service category. Succeeding chapters present more detailed discussions of all aspects of the plan.

II OVERVIEW

RUFFING CENTER IMPLEMENTATION

The major elements of this plan, as it pertains to the Ruffing Center, are as follows:

A) Implementation of MVS/JES3 to replace MVT/ASP for Batch Service scheduling.

B) Migration of all MVT services to the more secure and reliable MVS environment.

C) Installation of two new processors to satisfy projected requirements and meet the objective of providing reliable service to all CDP customers.

D) Enhanced system availability through improved I/O and communications configurations and the installation of more reliable hardware and software.

The implementation of MVS/JES3 is scheduled for the 4th quarter of FY77. This is the first step in CDP's migration to the more secure and reliable MVS operating system. With the implementation of MVS/JES3 on the 168-2, the GIM Production service (GIMP) running on the 195 will no longer have to contend with ASP. This will improve response for the GIM user community.

The later migration of both Batch and on-line services (GIMP and OCR) to operate under the MVS Operating System will provide more security and reliability for these services. A combination of the software design of MVS and the 370 hardware provide for greater separation of programs running in a multi-program environment. The RACF facility of MVS provides for controlled access to user data and programs. MVS software also provides improved facilities for recovering from hardware failures.

The first new processor, scheduled for installation in early CY78, will be devoted to the VM service. VM provides time-sharing facilities for all Agency users and is the input medium for a majority of the Batch work. To insure that sufficient hardware resources are available for this critical service, this new machine must be capable of processing speeds in the range of the IBM 3033, Amdahl 470V/6 or equivalent. With installation of the new processor, the 168-1 will be free to run the GIM Production service under MVS. A combination of the MVS software and the 370/168 hardware will provide a much more reliable environment for the GIMP Service.

The second new processor, scheduled for installation in the first quarter of FY79, will be used to process MVS batch work. With the addition of this processor to the Ruffing Center

configuration ODP will, for the first time, be in position to provide single CPU failure backup to all critical on-line services without severly impacting the Batch Service.

SPECIAL CENTER IMPLEMENTATION

Since a decision on CAMS funding and requirements is still pending, the major elements of the plan as they pertain to the Special Center are concerned with meeting DDO/ISS Service requirements. These major elements are:

A) Hardware enhancements to the current 158 Red and Blue configuration.

B) Implementation of MVS to replace SVS.

To provide sufficient hardware resources to meet the projected requirements of DDO/ISS, the following equipment modifications will be made to the current 158 Red and Blue configurations:

A) Attached processors will be added to both the Red and Blue 158s.

B) The Red and Blue processors will be upgraded from Model 1s to Model 3s.

C) 2 megabytes of memory will be added to each machine (4 megabytes total).

D) 3 strings of 3350 type disk drives will replace 3 strings of 3330 mod 1 drives and 2 strings of 3330 mod 11 drives for a net increase of 1,600 megabytes of on-line storage.

E) A fifth block multiplexor channel will be added to each machine.

The MVS operating system will be implemented on both machines to replace the current SVS Operating System. MVS will be implemented as soon as the hardware upgrades are installed in early CY78. This change is required to utilize the new hardware and will provide the enhanced security and reliability associated with MVS.

Attachment A is a PERT Chart of the major milestones associated with the implementation of the entire plan.

AVAILABILITY

The major thrust of previous ODP Computer System Plans was to provide additional capacity to meet a rapidly expanding

workload, especially in the area of VM and GIM Production (GIMP) Service. A major thrust of this plan is to improve the level of availability the user sees at his terminal.

Availability today for VM and GIMP Services is around 94%. This level of service is not acceptable to CDP customers and has resulted in a situation where the number one complaint is availability of service. In the past response time had been the major complaint, but with the installation of the three 370/168s, response has been adequate when all the machines were operational.

Availability models developed for the VM and GIMP Services closely match the observed availability of these services as measured over the last six months. Using these same models, the availability of the VM and GIMP Services is predicted to be around 98% after the installation of the second new processor. Without backup hardware, it is estimated that, the availability for VM would be around 88% and 80% for GIMP. The much lower figure for GIMP is due to the availability characteristics of the 195 (91%) as compared to the 168s (98 to 99%). Attachment B is a tabular summary of availability statistics for all of CDP's major hardware components over the past six months.

In order to provide VM and GIMP service availability at the 98% level, this plan calls for providing backup for COMTEN front-end processors and improvement of CPU and disk drive backup. In all cases backup CPUs are used to process batch work rather than remain idle. This approach complicates switching in a backup situation but provides more utility and improved turnaround time to CDP Batch Service customers.

A major advantage of this plan is that it provides sufficient batch capability to assure rescrable Batch Service while running in a backup mode. Past experience has shown that a prolonged failure of the Batch Service can severely impact on-line users, since many on-line data bases require batch runs for updating.

The added capability of the configurations proposed in this plan will also provide improved backup capacity, and therefore improved availability, for other ODP services (e.g. CCB and SANCA).

III REQUIREMENTS

Table 1 presents a breakdown of projected requirements for each of the major categories of service provided by ODP. The unit of measure for each of these services is a function of the nature of the application and the tools available to measure the application's utilization of resourses. In all cases it is fundamentally a measure of the CPU and memory requirement of the service.

Reference 1 is the ODP Planning Staff paper establishing these requirements. References 2 and 3 are requirements papers provided to ODP by DDO and OCR. Communications and peripheral equipment requirements are covered in chapters VII and VIII of this paper.

The objective of this plan is to meet the requirements outlined in Table 1 in the most cost effective and reliable manner. Table 2 outlines the plan's schedule for providing the resources needed to meet the established requirements through FY80. Table 3 presents data on the capacity of each type of processor involved in this plan to run ODP's major services. Since OCR and DDO/ISS requirements are already cited in terms of machine capacity, they do not appear in this Table.

After the installation of the second new processor, the major growth services, VM, GIM production (GIMP), Batch and DDO/ISS will all have sufficient processing power to meet their requirements through FY80. These requirements will be met in the following manner:

VM - To be run on the 1st new processor with a capacity to service 240 concurrent users.

GIMP - To be run on the 168-1 with a capacity to handle 18,000 transactions per prime shift.

Batch - To be run on the 168-3 and the 2nd new processor. These machines will have the capacity to process 150 360/65 equivalent CPU hours per day. As soon as all MVT work has been converted to MVS, the 195 will no longer be needed as a Batch processor.

DDO/ISS - To be run on the 158 Red and Blue configurations. This will provide 340% of the capacity of a single model 1 370/158 machine.

TABLE 1

ODP WORKLOAD PROJECTIONS - 370/168
(Data Are Fiscal Year-End Values)

	TQ 76 (Act)	FY 77	FY 78	FY 79	FY 80	FY 81	FY 82	FY 83
VM (Daily Peak Concurrent Users)	120	150	180	210	240	270	300	330
BATCH (Avg. Daily 360/65 CPU Hours)	88	98	108	118	128	138	148	158
GIMS (Peak Daily Transactions)	9,000	11,000	13,000	15,000	17,000	19,000	21,000	23,000
OCR (On-Line Daily 360/65 CPU Hours)	6.1	6.0	6.0	6.0	6.0	6.0	6.0	6.0
DDO (% of 370/158 Capacity).	80	130	200	240	265	290	315	340

VM projections represent a growth rate of 30 daily peak concurrent users per year.

BATCH projections represent a growth rate of 10 360/65 equivalent CPU hours/day each year.

GIM projections represent a growth rate of 2,000 peak daily transactions per year.

OCR and DDO projections are derived from requirements papers (References 2 and 3).

TABLE 3 PROCESSOR CAPACITY FOR CRITICAL GROWTH SERVICES

	360/65	360/195	370/158 (model 1)	370/168 (model 1)	3033 or 470V/6 [1]
VM [2] (CONCURRENT USERS)	N/A	N/A	60	160	240
BATCH [3] (360/65 CPU EQUIVALENT HOURS/DAY)	15	105	18	60	90
GIM [4] (TRANSACTIONS/PRIME SHIFT - 8:00 TO 17:00)	4,500	22,500	5,600	18,000	22,500

[1] 3033 is assumed to be approximately equal to 470V/6

[2] VM cannot run on 360 machines. 158 and 168 capacities are based on production experience. 3033 and 470V/6 capacity is extrapolated as a function of CPU speed.

[3] Batch capacity measures assume 70% CPU utilization for 22 hours per day. (Relative CPU powers are assumed as follows: 65=1, 195=7, 158=1.2, 168=4, 470V/6 or 3033=6)

[4] GIM capacity is derived from GIM batch benchmark data and production experience on a 360/65 dedicated to GIM work.

SCHEDULE TABLE FOR MAJOR SERVICE
UPGRADES TO MEET PROJECTED REQUIREMENTS

TABLE 2

APPLICATION	CURRENT CPU RESOURCE	PROJECTED DATE REQUIREMENT EXCEEDS RESOURCE	PLANNED RESOURCE UPGRADE	PLANNED DATE FOR UPGRADE	PROJECTED DATE REQUIREMENT EXCEEDS UPGRADE
VM	DEDICATED 168-1	END OF FY77	NEW PROCESSOR (3033 or 470V/6)	EARLY FY78	END OF FY80
BATCH	DEDICATED 168-2 PARTIAL USE OF 168-3	MID FY79	NEW PROCESSOR (3033,470V/6 OR 470V/7)	EARLY FY79	END OF FY83
GIM PRODUCTION	195 SHARED WITH ASP	EARLY FY78	195 WITH-OUT ASP	LATE FY77	EARLY FY81
			DEDICATED 168-1	EARLY FY78	
OCR ON-LINE APPLICATIONS	DEDICATED 158-1	NO PROJECTED INCREASE	NO UPGRADE PLANNED	N/A	THROUGH FY83
DDO/ISS APPLICATIONS	2 DEDICATED 158s (RED & BLUE)	END OF FY77	ATTACHED PROCESSORS, INCREASED MEMORY, UPGRADE TO MODEL 3s	EARLY FY78	EARLY FY81

IV RUFFING CENTER IMPLEMENTATION

This chapter describes the CPU and software application changes to be made in the Ruffing Center during this planning period. Four major changes will be made: the batch scheduling and spooling facility will be converted from MVT/ASP to MVS/JES3, all major MVT services will be converted to run under MVS, a new processor will be acquired for the VM time-sharing service and a second new processor will be acquired to run the majority of the MVS batch workload.

The process of converting Batch Service users from MVT to MVS will require that ODP provide both MVT and MVS systems during the migration period. After the installation of the first new processor, the 168-3 will run MVS and the 195 MVT to fulfill this requirement.

In addition to meeting projected demands through FY80, this plan provides, for the first time, the following advantages:

A) The reliability and security of the MVS environment.

B) The isolation of the GIM Production Service (GIMP) on a CPU capable of providing both responsiveness and reliability.

C) The capability of backing up all on-line production applications including CCF.

D) The capability of providing backup for single CPU failure without severely impacting Batch Service.

E) The capability of reacting to the failure of two CPUs at the expense of Batch throughput.

F) Improved reliability through increased I/O channel redundancy.

The continued growth and utilization of both VM and GIM Production well beyond the prime shift hours requires that these services be provided on a 24 hour basis. With the installation of the first new processor for VM, sufficient processing power will be available to provide 24 hour service to both VM and GIMP. To more fully utilize the power of the new VM machine during non-prime hours GIM Production will be run on a virtual MVS system under VM.

With the VM and GIMP Services both running on the same machine during non-prime hours, the 168-1 will be available to satisfy peak Batch processing loads. The 168-1 will be available for new system testing and development during non-prime hours since the requirement for CCF on-line service is limited to the

prime shift.

During FY78, the feasibility of using Mass Storage in the Ruffing Center will be studied. Contingent upon the results of this study, a Mass Storage System may be implemented in FY79 or 80.

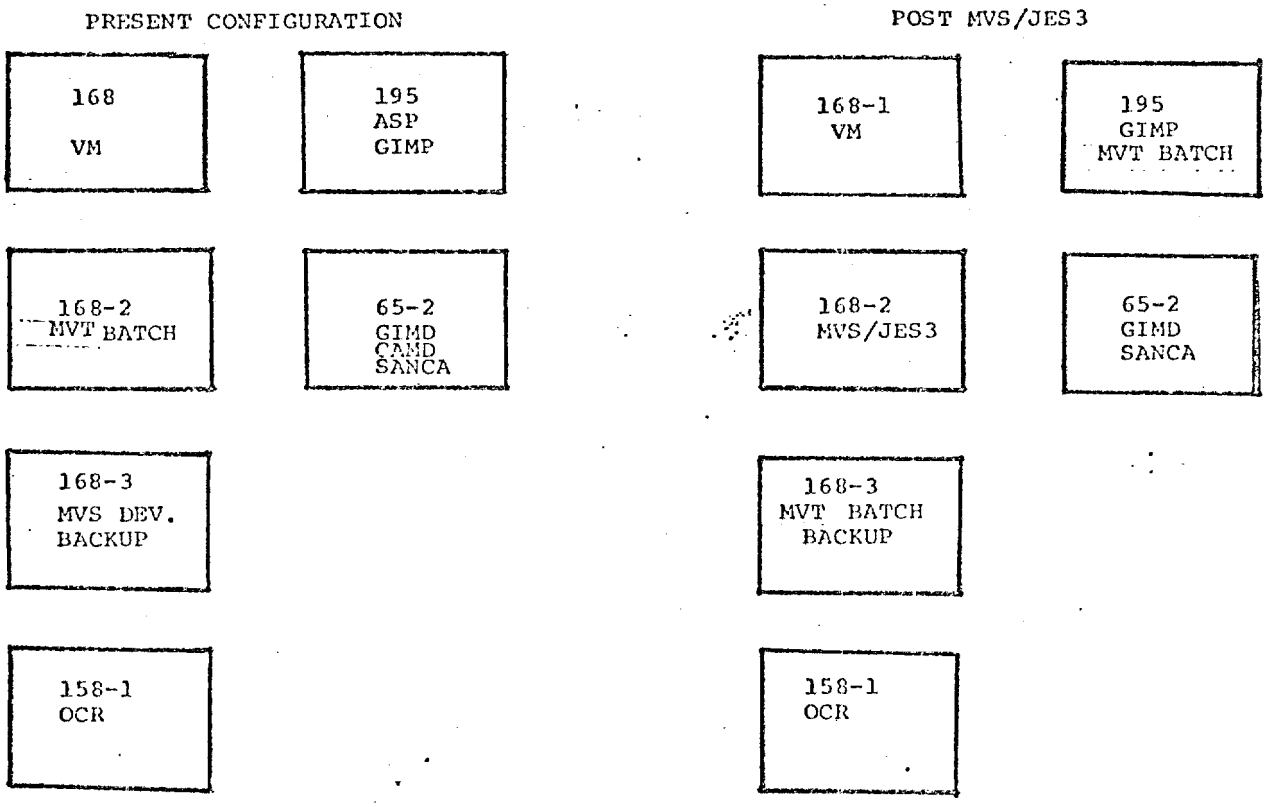
By late FY78 GIM Development will be moved to the 195 and SANCA will be converted to run under MVS and moved to the 168-2. This will allow for the release of the 65-2.

After the installation of the second new processor in FY79, the majority of the batch work will be run under MVS. The 195 will support the GIM Development Service and some residual MVT batch work. By FY80 all batch work will run under MVS and the 195, which is incompatable with MVS, will be under-utilized. At this time the GIM Development Service will be transfered to one of the batch processing machines (168-3 or 2nd new processor) under MVS and the 195 will be released.

Figure 1 depicts the Ruffing Center CPU/Application configuration before and after the conversion to MVS/JES3. Major milestones and configuration advantages and discrepancies are also listed. Figures 2 and 3 portray CPU/Application configurations before and after installation of the two new processors. Milestones, advantages and disadvantages are listed for each configuration.

Figure 4 is a chronological list of all significant milestones pertaining to the Ruffing Center. Chapter V provides a detailed discussion of each of the Ruffing Center's major applications and how they are affected by the plan.

PHASE I



MAJOR MILESTONES

1. MVS/JES3 implemented to replace ASP for batch scheduling - 4th Quarter FY77

CONFIGURATION ADVANTAGES

1. More reliable batch scheduling facility (MVS/JES3 replaces MVT/ASP).
2. First step in conversion to more reliable and secure MVS environment completed.
3. GIMP response improved by running as top priority task on 195 (ASP contentio removed).

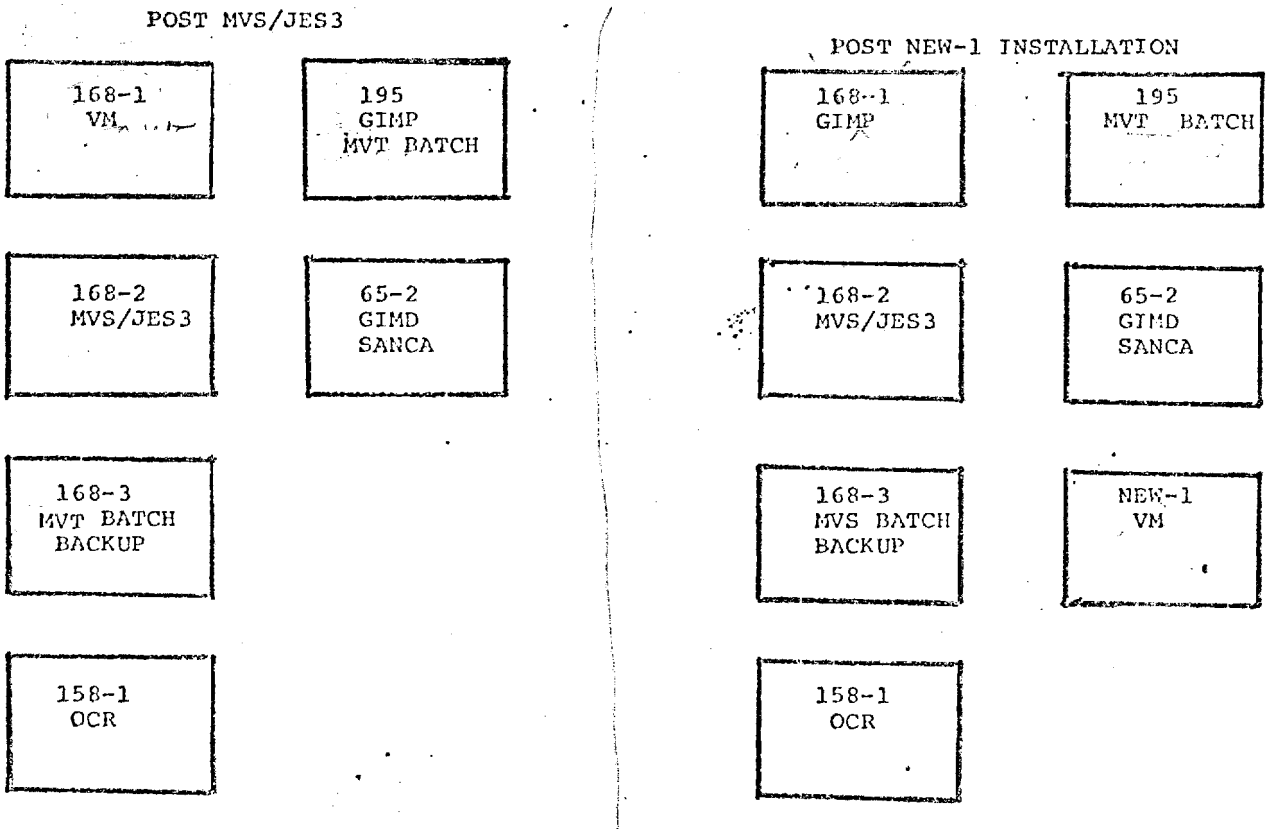
CONFIGURATION DEFICIENCIES

1. Using 168-3 to backup on-line applications (VM, GIMP, MVS/JES3) severely impact batch throughput.
2. OCR On-line Service not backed up.
3. GIMP running on less reliable 195 under MVT.
4. VM computer (168-1) saturated.

FIGURE 1.

RUFFING CENTER PLAN

PHASE II



MAJOR MILESTONES

1. Install New Processor (New-1), a 3033 or 470V/6 - January 78
2. Move VM to New-1 - February 78
3. Move GIMP to 168-1 under MVS - March 78
4. Convert 168-3 from MVT batch to MVS batch - May 78

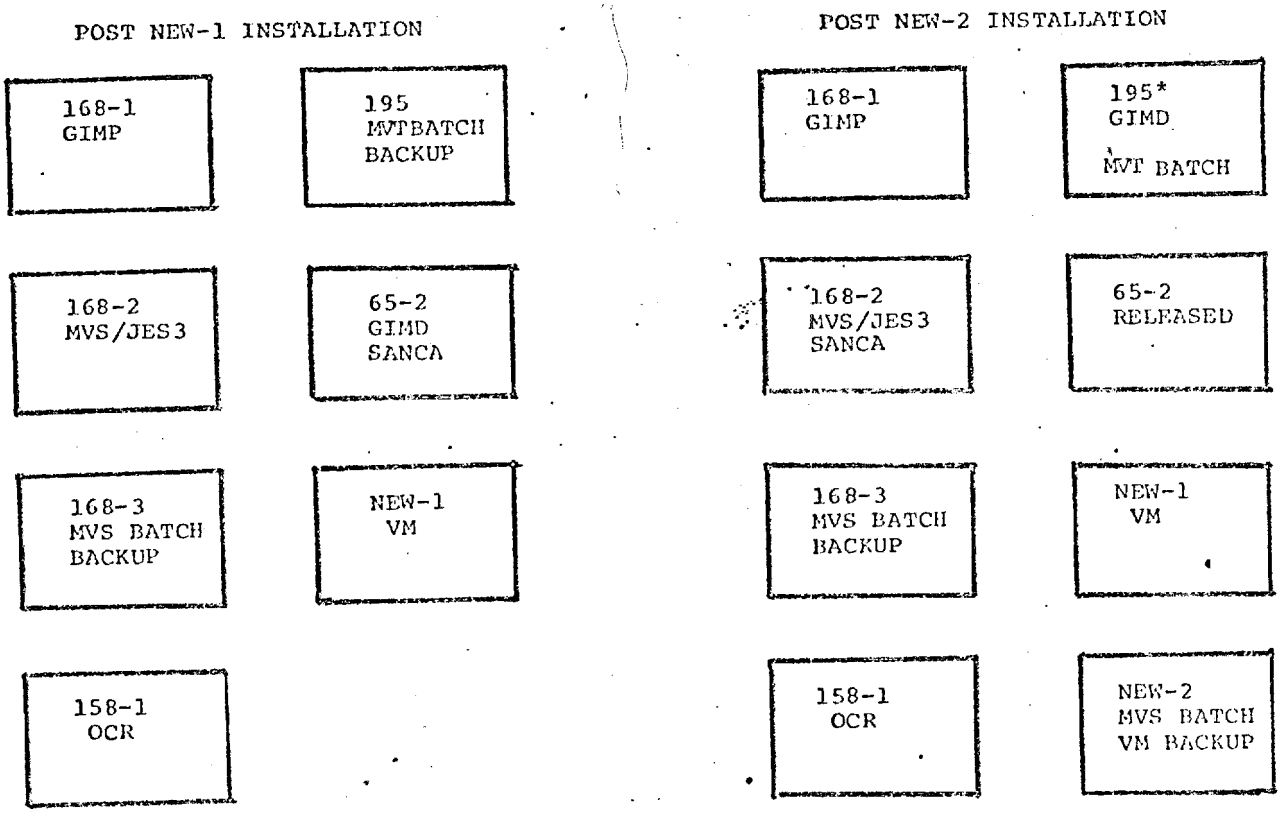
CONFIGURATION ADVANTAGES

1. VM capacity expanded to handle projected workload through FY80.
2. GIMP reliability improved. Capacity to handle projected workload through FY80.
3. Backup capability on two machines (168-3 or 195). 195 could backup OCR On-line Service.
4. Capability to run batch work under MVT or MVS.

CONFIGURATION DEFICIENCIES

1. Using 168-3 to backup VM, GIMP or JES3 severely impacts MVS batch throughput.
2. Using 195 to backup OCR severely impacts MVT batch throughput.
3. VM backup with 168-3 will give degraded service.

PHASE III



MAJOR MILESTONES

1. GIMD moved to 195 - July 78
2. SANCA moved to 168-2 - July 78
3. 65-2 released - August 78
4. Install New Processor (New-2) - November 78

CONFIGURATION ADVANTAGES

1. Capability to backup on-line services without degrading the Batch Service.
2. Capability of backing up two on-line systems simultaneously with only Batch Servi impacted.
3. All major services running under more secure and reliable MVS or VM systems.

CONFIGURATION DEFICIENCIES

No major deficiencies. All requirements satisfied through at least FY80.

* To be released in FY80. GIMD moved to 168-3 or New-2.

FIGURE 3.

FIGURE 4

RUFFING CENTER SIGNIFICANT MILESTONES

1. Master Addressing Plan.
   To be completed by 1 October 77

2. Installation of T-Bar switching unit.
   To be completed by 30 November 77

3. Site preparation for 1st new processor.
   To be completed by 30 November 77

4. Tape Pool reconfiguration for new processor.
   To be completed by 30 November 77

5. Phase I of Disk Plan implementation.
   To be completed by 30 December 77

6. Installation of 1st new processor.
   To be completed by 30 January 78

7. 1st new processor brought into production environment.
   To be completed by 28 February 78

8. RACF data set naming convention established.
   To be completed by 28 February 78

9. Conversion of GIM Production System to run under MVS on 168-1.
   To be completed by 30 March 78

10. MVT Batch Service transfered to 195.
    To be completed by 30 March 78

11. MVS Batch Service brought up on 168-3.
    To be completed by 30 May 78

12. Night GIM Production converted to run under VM on 1st processor.
    To be completed by 30 June 78

13. OCR On-line Service converted to run under MVS on 158-1.
    To be completed by 30 June 78

FIGURE 4 CONTINUED

14. GIM Development Service moved to 195 from 65-2.
    To be completed 30 July 78

15. SANCA converted to MVS and moved to 168-2.
    To be completed by 30 July 78

16. 65-2 Released.
    To be completed by 15 August 78

17. FY78 Disk Plan completed.
    To be completed by 30 August 78

18. Switch network (2914s) reconfigured to provide full backup for OCR on-line service.
    Tp be completed by 30 August 78

19. Implementation of 2nd Byte Mux Channel on VM machine (1st new processor).
    To be completed by 30 August 78

20. Site preparation for 2nd new processor.
    To be completed by 30 September 78

21. 24 hour VM Service provide to user community.
    To be provided by 30 September 78

22. Instalation of 2nd new processor.
    To be completed by 30 November 78

23. 2nd new processor brought into production environment.
    To be completed by 30 December 78

24. GIM Development Service transfered from 195 to 168-3 or 2nd new processor.
    To be compeleted by 30 March 79

25. All Batch Service converted to run under MVS.
    to be completed by 31 July 79

26. 195 Released.
    To be completed by 30 October 79

V MAJOR RUFFING CENTER APPLICATIONS

This chapter describes the major customer application and service areas provided by CDP in the Ruffing Center. The major services are:

VM - the generalized time-sharing service

Batch Service - the major batch processing facility for all Agency customers.

GIM Production - the large on-line data base service.

OCR on-line Service - the Interim SAFE and OCR on-line applications for the Office of Central Reference.

GIM Development - the test facility for customers developing applications for GIM production or CAMS

Other On-line Services - currently, TADS on the 67-1 in 1D16 for Office of Weapons Intelligence, SANCA for the Office of Security and [redacted] for the Office of Scientific Intelligence.

25X1A

Succeeding sections of this chapter describe each service, discuss future plans and projections for the service and cite the implications of each step in the plan as it pertains to this service.

The VM Service

The VM (Virtual Machine) operating system is an IBM SCP (System Control Program) that runs on IBM 370 or 370 compatable machines. This system provides two major facilities for the user. The CMS (Conversational Monitor System) facility provides the tools required for interactive on-line computing. The Virtual Machine facility allows a number of different IBM SCPs to be run concurrently on the same machine.

CMS is currently, and will continue to be, CDPs primary time-sharing facility. Using CMS customers create or modify source code and data on-line to be run in the batch environment. Approximately 75% of all work submitted to the batch facility is introduced in this manner. This greatly simplifies operational procedures and optimizes customer resources.

The CMS SCRIPT facility allows users to maintain on-line text files and update or edit them for printing. This plan, for

example, was produced using the SCRIPT facility.

The RAMIS system, a data base management facility for relatively small files, and the AFL and DYNAMO systems are examples of other interactive facilities which enhance the productivity of ODP customers. In addition, many customer produced subsystems are run under CMS.

The Virtual Machine facility is especially valuable to ODP systems programmers as a testing environment for the development of new versions of currently used IBM SCPs or Program Products (eg. MVT, MVS, CICS, etc.)

VM is currently run on the 168-1 in the Ruffing Center. Peak loads occasionally exceed 160 concurrent users . This is about the maximum load the 168-1 can accomodate without severly degrading user response. Since so many customers are dependent on VM service (up to 2,000 logons and 500 unique users per day) and because it's relation to the Batch Service is so critical, it is absolutely essential to ODP to maintain an acceptable level of response for this facility.

To meet the projected demand in FY78, the plan calls for increasing this system's capability by acquiring a more powerful processor than the 370/168. The recently announced IBM 3033 or Amdahl 470V/6 will provide a 50% or greater increase in CPU speed, the most critical resource for VM enhancement. Increased memory size (6 to 8 megs) and an enhanced peripheral configuration will also be required to take advantage of the CPU's power.

The increased number of channels available on these machines (3033 or 470V/6) will provide a configuration with greater I/O redundancy for improved reliability. Attachment C presents the proposed configuration for the VM processor.

Although definitive benchmarks or machine capability figures for these new processors are not available, a conservative estimate of approximately 240 concurrent users should be accomodated by either of these machines. According to workload projections (see Table 1, Chapter III), this should satisfy the ODP requirement through FY80.

Beyond the FY80 time frame an attached processor configuration or a still more powerful CPU may be required for VM. The alternative of running two VM machines is not attractive, in the ODP environment, because the VM system does not have the capability to share its data across separate machines. A multiple machine environment for VM would increase operational overhead and significantly complicate terminal switching and facility sharing problems.

The Batch Service

The Ruffing Center Batch Service is provided by ODP to fulfill Agency batch processing requirements. The input, scheduling and output of all this work is currently controlled by ASP (Attached Support Processor). ASP runs, at top priority, under the MVT operating system on the 195. Approximately 100 360/65 equivalent CPU hours of work (1500 jobs) are run daily. The majority of these batch jobs are run under ASP control on the 168-2. Some of the work is processed on the 168-3 during non-prime hours (1800 - 0600).

These resources are sufficient to process the current daily workload with reasonable turn-around and no morning backlog provided there are no significant hardware problems. Unfortunately the instability of some of the equipment, particularly the 195, frequently impacts this service. Attachment B provides reliability and availability history for all of ODP's CPUs.

To improve this service, reduce the impact on the GIM Production Service and to move toward the more reliable and secure MVS environment, this plan calls for converting from MVT/ASP to MVS/JES3.

The MVS/JES3 batch system scheduler, to be implemented in the fourth quarter of FY77, will run on the 168-2. Initially the vast majority of user work will still run under MVT, primarily on the 168-3. The 168-2 under MVS will be able to run a small number of jobs to initiate user conversion to MVS.

The 168-3 will continue to be the backup machine for online systems (VM and GIMP). The Batch Service will therefore be vulnerable to machine outage during the prime shift.

With the installation of the second new processor in FY79, ODP will be in a position to convert all of its batch work to MVS. The MVS software, in conjunction with the 370 hardware, will provide a more reliable batch environment with significantly improved security facilities. This improved reliability and the added power of the new processor will enable ODP to meet its expanding batch requirements through FY83.

Since the resources of the second new machine and the 168-3 will both be available to process batch work, a single CPU failure will no longer require the curtailment of batch service during prime shift periods.

GIM Production Service (GIMP)

The GIM Production Service is the generalized data base system provided by ODP for customers with large data base requirements. The system runs on the 195 in the Ruffing Center with 26 data bases currently on-line and others being developed. The system is currently processing approximately 11,000 transactions per day with up to 65 terminals on-line at any given time.

Although response times and service levels are generally good, especially in comparison to levels of service provided in the past, 195 stability and the fact that GIMP shares 195 resources with the ASP batch scheduler still impact user service. GIMP response is particularly sensitive to ASP activity because the ASP task runs at a higher pricrity.

With the implementation of MVS/JES3 to schedule all batch work, the ASP facility will be terminated on the 195. At this time, 4th quarter FY77, the remaining resources on the 195 will be used to run batch jobs. Since the batch work will run at a lower priority than the GIMP task, GIMP response will on the average, be improved and be considerably more consistent.

The installation of a new CPU for VM in early 1978 will free the 168-1 to be used as the primary GIMP machine. The improved reliability of this equipment (98% to 99% availability vs. 91% for the 195) will greatly enhance the availability of the GIM Production Service.

The combination of less resource contention, improved GIM software (release 4), and the conversion of GIM to run under the more reliable MVS operating system, along with the greater reliability of a 168, will serve to improve GIMP availability from 94% to 98%. These improvements should be sufficient to provide good service to the GIMP user community through FY80.

CCP On-line Service

During the prime shift (0700 - 1700) each week day the 158 in the Ruffing Center is dedicated to CCP on-line applications and some batch work in support of these programs. CCP (Office of Central Reference) runs 6 on-line programs daily during this period. AEGIS, RECON and ISGOLDE support CCP functions while COLTS, OLTA, and NUSAFE are run in support of the Interim SAFE project.

ISGOLDE and NUSAFE are on-line input applications. AEGIS and RECON are data base retrieval applications while COLTS and OLTA provide on-line text searching facilities.

In addition to the 6 previously mentioned on-line applications a batch program (MAD) is run hourly during the prime shift to update OCR data files. MAD is also run during non-prime hours but at less frequent intervals.

Daily peak loads, for all 6 applications, range from 40 to 45 concurrent users. Although some response time degradation is experienced during peak load periods, the 158-1 is in general, reasonably well matched to the CCF requirement at this time.

Since the requirements for the CCF on-line service are stable, this plan calls for keeping this service on the 158-1. To provide improved reliability and security for this service the operating system will be changed from MVT to MVS in FY78.

After the installation of the second new processor in FY79 ODP will be able, for the first time to provide backup for this on-line service.

GIM Development Service (GIMD)

The GIM information management system is a powerful tool for building, updating and querying a data base. The user can define very complex procedures for manipulating his data base with simple input commands. The corollary to this much flexability is however, the ability to cause program loops or other forms of degradation affecting all system users. For this reason, ODP provides a separate service for developing new GIM applications or for testing modifications to production systems. A GIM Development (GIMD) service is currently provided on the 65-2 in the Ruffing Center. 43 separate data bases are maintained or are under development on the 65-2, including a CAM development data base for the CAMS service run in the Special Center.

After the installation of the new processor for VM and the conversion of the majority of batch users to MVS, GIMD will be moved to the 195. SANCA, the other on-line application run on the 65-2, will be moved to the 168-2 under MVS. This migration will permit ODP to release the 65-2 which is incompatable with the MVS environment. The transfer of all applications from the 65-2 to the 195 and 168-2 should be completed by August 1978.

With the release of the 195 in FY80, GIMD will be converted to run under MVS and transferred to one of the batch machines (168-3 or 2nd new processor).

Other On-line Services

25X1A The other on-line services provided in the Ruffing Center are TADS, SANCA and [redacted] TADS (Telemetry Analysis and Display System) is currently being developed under a TFW contract for OWI. The Special Projects Staff is tasked with monitoring the development of this project. TADS will be run on the dedicated 67-1 under the CP67 operating system in room 1D16.

TADS will give telemetry analysts on-line capability to display, process and explcit digitalized telemetry data. This system is scheduled to be operational in mid FY78.

SANCA is currently run, for the Office of Security, on the 65-2. Three or four seperate SANCA programs are run on this machine, one for each terminal serviced. In addition a program called DSKSVC controls access to the data base for all the SANCA modules.

Although each of these programs is quite small, each SANCA program is 50K bytes and DSKSVC is 40K bytes, the operational aspects of providing this service would be simplified if it were run as one program. For this reason, SANCA will be converted to run under MVS as a single program and moved to the 168-2 by July 1978. Since SANCA's CPU requirements are very small it will run as the highest priority job on this machine.

25X1A
25X1A [redacted] is an on-line data base management system developed by the [redacted] for relatively small data base requirements. The only user of this system within the Agency is OSI. [redacted] is currently brought up, on request from OSI, on
25X1A the 168-2. When MVS/JES3 goes into production in the fall of 1977
25X1A on the 168-2, [redacted] will be run on the 168-3. This system will be converted to run under MVS on the 168-3 or replaced by an alternative system after the installation of the first new processor in early CY78.

VI SPECIAL CENTER IMPLEMENTATION

Two major categories of service are supported in the Special Center, the DDO/ISS service and the CAMS service. The DDO/ISS service consists of a number of both on-line and batch applications. These applications are run on two 370/158 model 1 computers called the Red and Blue. The CAMS online application is run on the 65-1. Some batch work in support of CAMS is run in the Ruffing Center. In addition to the batch work, a GIM Development service is provided in the Ruffing Center to test CAMS production system modifications.

To provide backup capability for the CAMS service in the Special Center, the Blue 158 is configured to run CAMS when the 65-1 fails. When this backup capability is invoked, DDO/ISS must curtail its batch work and run some of its' on-line applications in a degraded mode.

Because future CAMS funding and requirements have not been defined at this time, this plan considers no changes to the present configuration. The remainder of this chapter deals with meeting DDO/ISS requirements through FY80.

Reference 2 is DDO/ISS's detailed requirements paper for all of its applications through CY81. A discussion of all current and projected DDO/ISS applications is also provided in Reference 2.

ODP's plans to meet DDO/ISS communications and peripheral equipment requirements are covered in chapters VII and VIII of this paper. The DDO/ISS requirement for increased CPU power is stated in terms of 370/158 capacity. DDO/ISS projects a requirement for approximately 340% of a single 158 by the end of CY81.

To satisfy this requirement, this plan calls for adding attached processors to both the Red and Blue machines, upgrading these machines from model 1s to model 3s and increasing the memory on each from 2 to 4 megabytes. A fifth block multiplexor channel will also be added to each machine to increase I/O throughput capacity. This enhanced configuration will satisfy the projected requirement since the attached processor increases the CPU power of a 158 by about 70%. Upgrading the 158s to model 3s will add an additional 10% of processing power to each machine.

An alternative to adding attached processors to the Red and Blue 158s would be to provide a larger CPU to replace one of the

158 machines and to utilize the remaining 158 for another service, (at least one of the 158s must be retained to provide backup capability for critical on-line functions). The objections to this alternative are as follows:

A) Since the 158s are owned machines, purchasing another CPU is a more expensive option than enhancing the present configuration.

B) The nature of OEP's other requirements (VM,Batch,GIM, possibly CAMS) are such that only a cpu of greater than 158 capacity would be useful.

C) Space limitations in the Special Center would make it extemely difficult to install another large mainframe without impacting production services.

To provide software capable of utilizing an attached processor, the MVS operating system will be implemented and replace the current SVS operating system on both machines. MVS also has the advantage of being more secure and reliable and will be a step toward standardizing the use of operating systems in both Centers.

The increase in memory from 2 to 4 megabytes for each machine will provide an environment better suited to the added power of the attached processor configurations. This added power will also lessen, although not alleviate, the impact of backing up the CAMS service on one of the 158s.

Should further enhancement to the 158 configurations be needed due to unforseen additional requirements; more memory, and fixed head storage for faster paging could be installed. Figure 5 on the following page lists the significant milestones associated with the implementation of the Special Center plan.

FIGURE 5

SPECIAL CENTER SIGNIFICANT MILESTONES

1. Master Addressing Plan

   To be completed by 1 October 77

2. Site preparation for attached processors.

   To be completed by 30 November 77

3. Memory upgrade for Red and Blue 158s (2 to 4 meg on each machine).

   To be completed by 30 December 77

4. Add 5th channel to Red and Blue 158s.

   To be completed by 30 January 78

5. Upgrade Red and Blue 158s from model 1s to model 3s.

   To be completed by 28 February 78

6. Attached processors installed on Red and Blue 158s.

   To be completed by 30 March 78

7. MVS/JES2 instaled to replace SVS/HASP as the operating system on Red and Blue 158s.

   To be completed by 30 April 78

8. FY78 ODP Disk Plan completed.

   To be completed by 30 August 78

VII COMMUNICATIONS PLAN

Three distinct communications networks, provide all remote services to ODP customers. The largest network, controlled by four COMTEN 3670 front-end processors, provides all remote access to the computers in the Ruffing Center. Remote access to the DDO/ISS 158s in the Special Center is controlled by a single COMTEN 3670 and two IBM 2702 controllers. Five IBM 3272 controllers provide direct access, for 3277 terminals, which are used primarily for the STAR system. Remote access to the CAMS 65-1 in the Special Center is provided through two MEMOREX 1270s.

The COMTEN 3670 is a powerful, programable front-end capable of handling up to 384 remote lines and routing their traffic to any one of 4 different CPUs as a function of input switching characters or under operator control. This flexability allows ODP to provide terminals that can perform many different functions, thereby greatly decreasing the cost of terminal installation. A COMTEN software enhancement, to be implemented this year, will allow ODP to monitor terminal utilization and better manage the use of this expensive resource.

The current COMTEN software system used by CIP limits network traffic to the 4 CPUs on any single COMTEN 3670. A combination of enhanced COMTEN hardware and a new software operating system will provide enhanced switching capability. New modem interface units and smaller node controlling processors to be offered by COMTEN provide for further network sophistication, lower total costs and more communication reliability.

ODP and the Office of Communications, are currently evaluating the advantages, to the Agency, of an enhanced Communication capability to remote sites. A detailed plan for the entire ODP network will be produced when this evaluation is completed.

In order to meet availability objectives, backup capability will be provided for the COMTEN 3670s in the Ruffing and Special Centers. This will require the installation of another COMTEN in the Special Center and extra line capability in both Centers. Backup capability for the 4 COMTENs in the Ruffing Center will raise availability from the current 96% to 99%. Backup capability in the Special Center will raise availability from 98% to 99%. The installation of the second COMTEN in the Special Center will allow for the release of the 2 IBM 2702 terminal controllers presently installed.

ODP's remote terminal population is composed primarily of Delta Data 5200 CRTs, Texas Instrument Silent 700s, IBM 2741s, Tektronix graphic displays and Metra remote job entry stations and printers. An RFP has been released for a new hard copy device to replace the current 2741s. Another RFP is currently being prepared for a new CRT device to satisfy future requirements for this type of equipment.

The Delta Data CRT is by far the most commonly used remote device. A total of 609 are currently installed and new requests are received at the rate of 135 per year. ODP has contracted to procure 150 more Delta Datas to fulfill these requirements thru FY78. After this time requirements will be met by the manufacturer awarded a contract as a result of the CRT RFP.

With the exception of the major implications which could result from the ODP/OC communications study no other significant communications changes are anticipated during this planning period.

VIII PERIPHERAL EQUIPMENT CONFIGURATIONS

The peripheral equipment provided by ODP in the Ruffing and Special Centers includes direct access storage devices (DASD), magnetic tape drives and a variety of unit record equipment. Attachment D lists all currently installed equipment. Attachment E is a list of equipment to be acquired to satisfy the requirements of this plan.

The majority of ODP's peripheral controllers are connected to CPU channels through IBM 2914 or T-BAR switching units. These switching units provide the following advantages:

A) The ability to electrically reconfigure peripheral controllers to different CPU's.

B) Line driver circuits which effectively extend the distance restrictions between CPU channels and peripheral controllers.

The reconfiguration facilities of switching units provide ODP with the ability to move applications from one CPU to another for backup purposes. The ability to locate peripherals at extended distances from CPU's is especially critical in the large and quite crowded environment of the Ruffing Center.

Current switching units are limited to 4 CPU channel input with 8 peripheral legs per unit. To provide for the increased byte multiplexor capability of the first new processor an 8 by 16 T-BAR switching unit will be installed. Increased byte multiplexor capability is required to accomodate the projected increase in concurrent VM users. This unit should be installed and tested well in advance of the first new processor installation.

No increase in unit record equipment is anticipated for either the Ruffing or Special Centers. To provide sufficient fixed-head storage for the paging requirements of the new VM prodcessor, 2 IBM 2305 controllers and 4 2835 fixed-head storage devices will be needed. An additional 2305 controller and 2 2835 devices will be needed for the second new processor in FY79.

No additional magnetic tape requirements are anticipated for the Special Center. The Ruffing Center tape pool will be upgraded to a 12 controller configuration from the present 11. 8 more drives will be converted to handle the 6250 bit per inch feature. The 5 current controllers which do not have two channel

access will also be upgraded to provide this feature.

These modifications, which will considerably improve the flexibility and utility of this configuration, should be completed by early FY78. Attachment F is a diagram of the Ruffing Center tape pool after all modifications have been accomplished.

The most significant peripheral equipment changes will take place in the DASD area. Expanding user requirements plus the requirements of the new large processors are the driving forces behind these changes. The expanded multiprogramming capability of the MVS operating system also increases the requirement for DASD space.

Attachment G lists projected space requirements for each of ODP's DASD configurations through FY80. A brief synopsis of the purpose of each of these configurations is also provided in this Attachment.

The basic guidelines employed in evolving the DASD plan were as follows:

A) Use all presently owned equipment.

B) Limit acquisitions to the new, more cost and space efficient Winchester technology equipment (IBM 3350's or equivalent).

C) Configure to improve total system availability and throughput through multi-channel access.

D) Satisfy projected requirements in the most cost effective manner.

Four types of DASD equipment are currently installed in ODP's Computer Centers; single density 2314's, dual density 2314's, 3330 Mod Is and 3330 Mod IIs. These generic types are provided by CALCOMP, IBM and CDC. The Winchester drives (3350s or 3350 equivalents) will be acquired to satisfy future requirements.

Each type of drive has different throughput characteristics. 2314s are optimally used only on selector channels while 3330s and 3350s must be attached to block multiplexor channels. The configurations cited in Attachment G are designed to meet the throughput requirements of the computer systems to which they will be attached, as effectively as possible, within the

constraints of the equipment available.

Present ODP DASD configurations consist of 19 2314 type strings (8 drives per string), 22 3830 type disk controllers for 3330 type drives, 2 ISCs (integrated storage controllers on the Red and Blue 158s in the Special Center) and 222 3330 type drives (146 mod 1s and 76 mod 11s). This plan, to satisfy DASD requirements through FY80, calls for 7 additional 3830 type disk controllers and 56 3350 type drives.

IX SPACE REQUIREMENTS

The impact of this plan on CDP's existing space, power and air conditioning facilities has been evaluated by the Facilities Branch of the Engineering Division. The results of this evaluation are as follows:

A) Sufficient power (400 & 60 cycle), chill water, and air conditioning is available to support the Computer System Plan in both centers.

B) The Special Center has space available to meet requirements outlined in the plan.

C) Any growth to CAMS will require additional space outside of this study.

D) The Ruffing Center will require additional space by June 1978.

E) Two existing major space deficiencies within the Ruffing Center are the lack of adequate space to meet current tape vault requirements and the lack of space to secure the Control Point in an effective manner.

Tables 4 and 5 provide overall details of space utilization and projections in both centers. Figures 6 through 10 provide further details on the particular items involved. It is estimated that an additional 4,300 square feet of computer floor space will be required, by June 1978, in the Ruffing Center. If space cannot be obtained by June 1978, Facilities Branch would be in the undesirable position of using the current staging area to meet FY79 requirements. Using the staging area would result in the Ruffing Center being saturated with computer equipment by June 1979. Any expansion after June 1979 would be much more difficult and impact user availability of services.

The major highlights of the space plan as it affects the Ruffing Center are as follows:

A) CPU's

Floor space is available for the installation of new processors one and two. Although this plan indicates that the IBM 360/195 and the IBM 360/65-2 will be released, past experience has shown the potential for management to

reutilize idle systems for future requirements as was done in the case of TADS and CAMS. Therefore, CPU space requirements assume all existing systems remain through FY80. Figure 6 provides detailed CPU space requirements.

B) Tape Vault

The Ruffing Center Tape Vault is currently 425 square feet less than required. Approximately 50 square feet of tape storage, 125 square feet of Disk Media storage, 150 square feet of Data Erase Area, and 100 square feet of librarian work area are located on the computer floor. The vault must be increased as soon as possible.

C) Online Storage and Mass Storage

Online storage requirements continue to increase. The current staging area may have to be used to meet FY79 growth. FY80 shows no increase in online storage space based on the assumption of a Mass Storage system installation. Additional space (800 sq. ft.) will be required to install a Mass Storage system. Figure 7 provides detail online storage space requirements.

D) Control Point

ODP and the Office of Security have begun a study on a new method to distribute ODP Computer output and to improve the security of the point area. This method may require the installation of Post Office type mail boxes, which would require up to 500 square feet of space. Additional space is also required to improve the TMS user interface area and to provide a seven day paper storage area. Figure 9 provides detailed Control Point requirements.

E) Staging Area

Past experience has shown that approximately 1000 square feet of computer floor in the Ruffing Center is required to be used as a staging area. Currently this space is available in 1D16. If space is not provided by June 1978, the Staging area must be used to meet FY79 requirements. As a result, future installation or reconfiguration of computer equipment in the Ruffing Center will be more difficult and will impact user system availability.

F) GIM Control Area (DAC)

In addition to the total space package, 1000 square feet of space is required to relocate the GIM Control Area (DAC) to the Ruffing Center. This is required to allow for improved communications between the DAC operators and the Ruffing Center Main operator.

Floor space is available in the Special Center to meet 158 Red and Blue upgrades and the projected on-line growth. Estimates for the Special Center do not include any growth for the CAMS system. Table 5 and Figure 10 provide detail information for this Center.

RUFFING CENTER FLOOR SPACE
(SQ. FT.)

USE	OCT. 74	OCT. 77	OCT. 78	OCT. 80	COMMENTS
CPU's	2830	4696.5	5606.5	6061.5	See Figure 6
Tape/Disk Pool and Main Operator area	1320	1735	2000	2000	
Tape Vault	1000	1000	2000	2000	Must be increased ASAP Oct. 78 includes Disk media.
Online Storage	2557	4502	5751	5751	See Figure 7
Mass Storage	----	----	----	800	
Communications Equipment	572	405	530	530	See Figure 8
Control Point & Offices	2200	2200	3000	3000	See Figure 9
Peripheral Area	1060.5	951	951	951	Oct. 74 includes Mail Room. Oct. 77/78/80 includes lounge.
Staging Area	----	916	1000	1000	
Available Space	----	950	???	???	Based on what space is provided.
Miscellaneous	2660	2844.5	2606.5	2606.5	Air Handlers, Walkways, etc.
GIM Control Area (DAC)	----	----	1000	1000	ODP will release 5D55 space.
TOTALS	14,200	20,200	24,444	25,699	

TABLE 5

USE	Oct. 74	Oct. 77	Oct. 78	Oct. 80	Comments
CPU's	400	802	976	976	Assumes no CAMS growth Figure 10
Tape Pool & Operator Area	384	640	640	640	
Online Storage	1042	1401	1401	1401	Figure 10
Communications Equipment	184	329	295	295	Figure 10
I/O Distribution Point	312	1154	1154	1154	
Tape Vault & Library Office	800	800	800	800	
Offices	252	564	564	564	
EAM & Lounge	1000	468	168	168	EAM Equipment Release in Oct. 78
Staging Area	N/A	432	500	500	In 'B' Room
Available Space	N/A	---	332	332	In 'B' Room
Miscellaneous	4526	2310	2070	2070	Air Handlers, Walkways, etc
TOTAL	8900	8900	8900	8900	

FIGURE 6

RUFFING CENTER

CPU FLOOR SPACE

TYPE	OCT. 74	OCT. 77	OCT. 78	OCT. 80
360/65-1	402	---	---	---
360/65-2	420	420	420	420
360/67-1	566	566	566	566
360/195	1018	1063.5	1063.5	1063.5
370/158-1	212	259	259	259
370/158-2	212	---	---	---
370/168-1	---	796	796	796
370/168-2	---	796	796	796
370/168-3	---	796	796	796
NP #1	---	---	455	455
NP #2	---	---	455	455
NP #3	---	---	---	455
TOTAL	2830	4696.5	5606.5	6061.5

NOTE: NP #1, NP #2, NP #3 based on size of IBM 3033 Processor which is the larger of the two possible candidates.

FIGURE 7

RUFFING CENTER

ONLINE STORAGE FLOOR SPACE

APPLICATION	Oct. 74	Oct. 77	Oct. 78	Oct. 80
SYSTEM	781	1031	1851	1851
ASP/JES	255	473	468	468
CP	340	---	---	---
VM	122	540	720	720
GIMP	272	436	624	624
GIMDEV	85	153	153	153
SANCA	51	51	51	51
SHARE	150	360	540	540
CRS	450	720	720	720
HYDRA	51	51	51	51
BACKUP	---	534	420	420
TADS	---	153	153	153
MASS STORAGE	---	---	---	800
TOTAL	2557	4502	5751	6551

FIGURE 8

RUFFING CENTER

COMMUNICATIONS EQUIPMENT FLOOR SPACE

TYPE	Oct. 74	Oct. 77	Oct. 78	Oct. 80
PATCH PANEL	118	78	78	78
COMTENS	171	228	380	380
3272's	27	27	36	36
MEMOREX	144	72	36	36
2848's	112	---	---	---
TOTAL	572	405	530	530

FIGURE 9

RUFFING CENTER

CONTROL POINT FLOOR SPACE

USE	Oct. 74	Oct. 77	Oct. 78	Oct. 8
OFFICE's	634	755	855	855
TMS AREA	---	216	316	316
I/O & DISTRIBUTION AREA	970	960	1460	1460
RAMP	85	85	85	85
UTILITY CLOSET & PAPER SUPPLY	18	81	181	181
2250 AREA	92	---	---	---
LOUNGE	190	---	---	---
MISCELLANEOUS	211	103	103	103
TOTAL	2200	2200	3000	3000

FIGURE 10

SPECIAL CENTER

CPU's	Oct. 74	Oct. 77	Oct. 78	Oct. 80
158 Red	200	200	287	287
158 Blue	200	200	287	287
360/65-1	---	402	402	402
TOTAL	400	802	976	976

Online Storage	Oct. 74	Oct. 77	Oct. 78	Oct. 80
System & DDO Applications	1042	976	976	976
System & CAMS	---	425	425	425
TOTAL	1042	1401	1401	1401

Communications Equipment	Oct. 74	Oct. 77	Oct. 78	Oct. 80
3272's	36	54	54	54
2702's	112	112	---	---
MEMOREX	---	36	---	---
COMTEN's	---	57	171	171
Patch Panel	36	70	70	70
TOTAL	184	329	295	295

ATTACHMENTS

A. PERT Diagram of Plan Implementation

B. Equipment Availability History

C. Proposed Configuration for New VM Processor

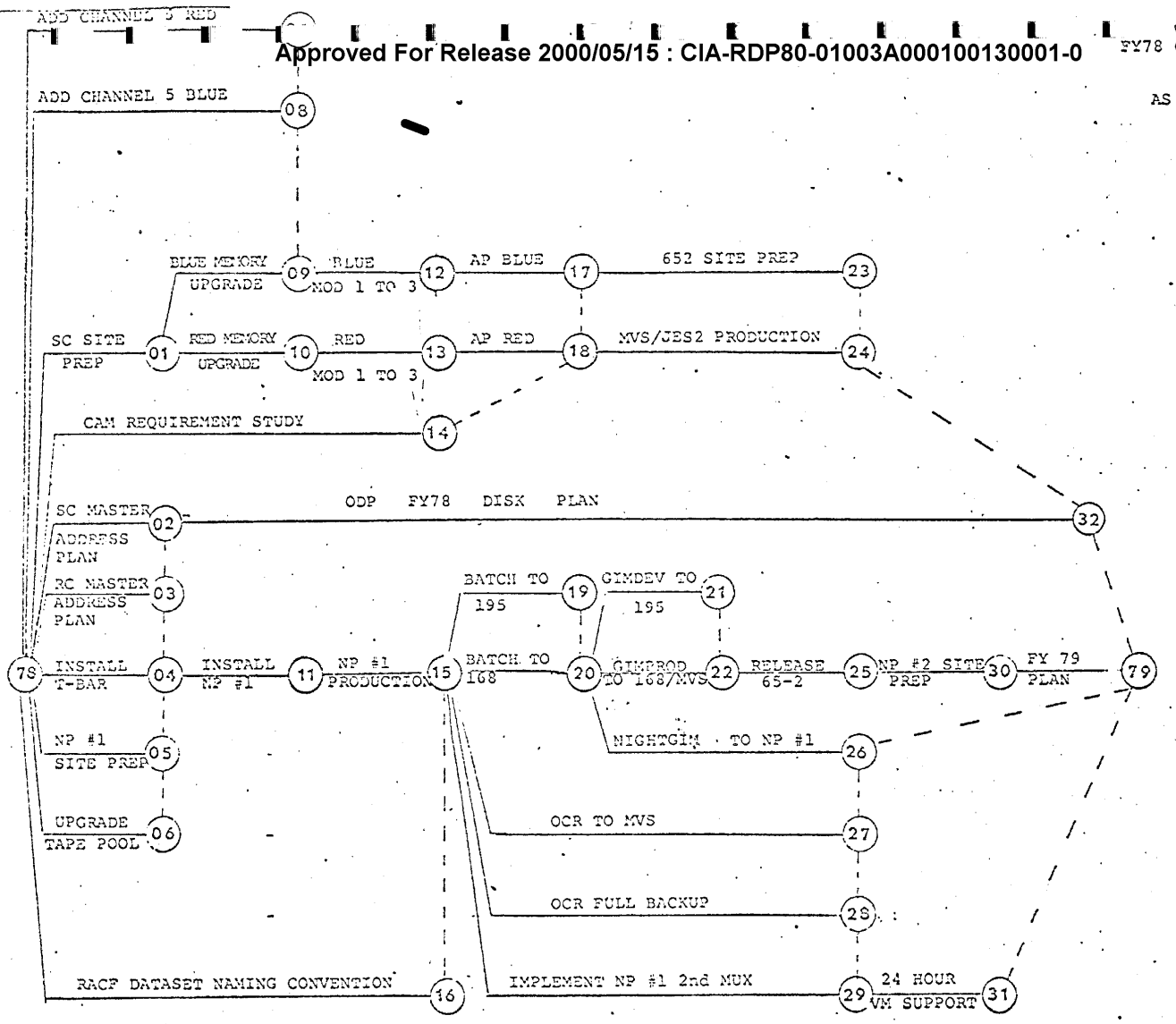
D. Current Peripheral Equipment List

E. List of Peripheral Equipment to be Ordered

F. Tape Pool Configuration

G. DASD Configurations

ATTACHMENT A

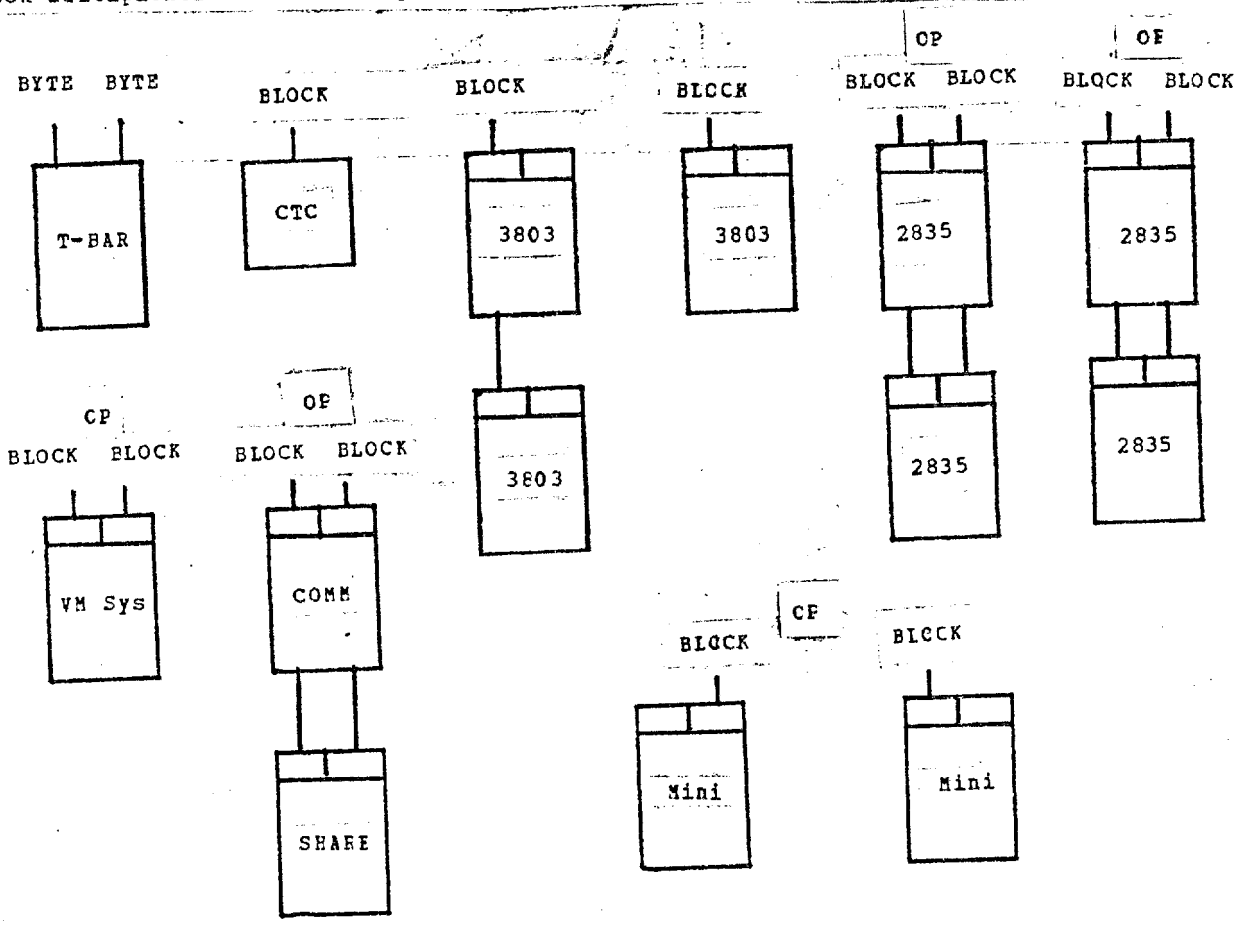


ATTACHMENT C

New Processor 1 configuration for VM

The following diagram depicts the total channel configuration that will be implemented on the 1st new processor for the VM Service. Specific channel numbers are not assigned because they will vary depending on the manufacturer of the machine. For example, the IBM 3033 I/O interface would have 3 directors with 6 channels each in the first 2 directors and 4 in the third. The Amdahl 470V/6 I/O interface seperates 16 channels into 4 quadrants of 4 channels each.

To minimize single point failure optional channels and generic types of equipment (eg. Fixed Head Storage) will be spread across directors or quadrants. Since specific channel numbers are not given, the diagram use BYTE to designate byte multiplexor channels and BLOCK for block multiplexor channels. Optional channel configurations are labled CP.



T-BAR - T-BAR Switching Unit

CTC - Channel to Channel Adapter

3803 - Tape Controllers (to have addresses Ex, FX and DX)

2835 - Fixed Head Storage Controllers (2 units per controller)

VM Sys - VM System DASD Controller

COMM - COMMON DASD Controller

SHARE - SHARE DASD Controller

Mini - VM Minidisk DASD Controller

ATTACHMENT D

CURRENT EQUIPMENT LIST

(A) CPU'S

- o IBM 360/65-2
  - One IBM 2065 Processing unit
  - Two IBM 2365 Processor Storage units
  - One IBM 2870 Byte Mulitplexor Channel
  - One IBM 2860 Selector Channel
  - Two CDC 23065 Core Memory Systems
  - One CDC 28801 Block Multiplexer Channel
  - One IBM 1052 Printer Keyboard

- o IBM 360/67-1
  - One IBM 2067 Processing unit
  - Four IBM 2365 Processor Storage units
  - One IBM 2870 Byte Multiplexor Channel
  - One IBM 2860 Selector Channel
  - One IBM 1052 Printer Keyboard

- o IBM 370/158-1
  - One IBM 3158 Processing unit
  - One IBM 3213 Printer
  - One CDC 33158 Memory System

- o IBM 360/195
  - One IBM 3195 Processing unit
  - One IBM 2870 Byte Multiplexor Channel
  - One IBM 2860-3 Selecter Channel
  - One IBM 2860-2 Selecter Channel
  - One IBM 2880-2 Block Multiplexer Channel
  - One IBM 3085 Power Distribution unit
  - One IBM 3086 Coolant Distribution unit
  - Three IBM 3080 Power units
  - One IBM 3060 System Console
  - One Intermem 7195 Memory System

- o IBM 370/168's (3 Systems)
  - Three IBM 3168 Processing units
  - Three IBM 2870-1 Byte Multiplexor Channel units
  - Three IBM 2860-3 Selecter Channel units
  - Six IBM 2880-2 Block Multiplexer Channel units
  - Three IBM 3066 System Consoles
  - Three IBM 3067 Power and Coolant Distribution units

- o One IBM 2314-B Direct Access Storage Facility unit
- o Three IBM 2319-B Disk Storage Facility units
- o Three IBM 3830-1 Storage Control units
- o Three IBM 3830-2 Storage Control units
- o Two IBM 3333-1 Disk Storage and Control
- o One IBM 3333-2 Disk Storage and Control
- o Twelve IBM 3330-1 Disk Storage units
- o One IBM 3330-2 Disk Storage
- o Seventy two CDC 33301 Disk Storage units
- o Fifty six CDC 33302 Disk Storage units
- o Thirteen CDC 33332 Controller Adapters
- o Three CDC 38301 Stroage Control units
- o Thirteen CDC 38302 Storage Control units
- o Four Calcomp CD14 Storage Controllers
- o Sixteen Calcomp CD22 Disk Storage units
- o Nine Calcomp CD1015 Storage Controllers
- o Eighteen Calcomp CD215 Disk Storage units

(C) TAPE DEVICES

- o Four IBM 3420-6 Magnetic Tape Units
- o Forty four IBM 3420-7 Magnetic Tape Units
- o Eleven IBM 3830-1 Tape Control units
- o One STC 3800 Tape Control unit
- o Two STC 3470 Magnetic Tape units

(D) I/O DEVICES

- o Three IBM 3811 Printer Control Units
- o Three IBM 3211 Printers
- o Seven IBM 1403 Printers
- o Four IBM 2821-1 Control units
- o Four IBM 2821-2 Control units
- o Four IBM 2540 Card Reader/Punch units
- o One IBM 2501 Card Reader
- o Three IBM 029 Key Punch units
- o One IBM 1018 Paper Tape Punch unit
- o One IBM 2826 Control unit
- o One IBM 2822 Paper Tape Reader Control unit
- o One IBM 2671 Paper Tape Reader

(E) DRUMS

- o Two IBM 2820 Storage Control units
- o Three IBM 2301 Drum Storage units

(F) FIXED HEAD DISK

- o Five IBM 2835 Storage Control units
- o Ten IBM 2305 Storage Modules

(G) SWITCHING UNITS

- o Seven IBM 2914 Switching Units

(H) TERMINAL DEVICES

- o One IBM 3215 Console Printer-Keyboard
- o One IBM 7412 Console Control
- o Three IBM 3272 Control units
- o Four Comten Communication Control Modules
- o Four Comten Teletype Consoles
- o Two Memorex 1270 Terminal Control units
- o Six IBM 3286 Printers
- o Two IBM 3288 Printers
- o Sixteen IBM 3277 Display Stations
- o Seven Delta Data Terminals
- o One GE TermiNet 1200 Terminal
- o Two TI Silent 700 Electronic Data Terminals

(I) OTHER

- o Page Reader
  - Two CDC 609 Magnetic Tape Transports
  - One CDC 955 OCR Page and Document Reader
  - One CDC 1713-3 Teletype terminal
  - One CDC 1732 Magnetic Tape Controller
  - One CDC 1774 System Controller

- o Plotters
  - One Calcomp 904 Contoller
  - One Calcomp 937 Tape unit
  - One Calcomp 1136 Drum unit
  - One Gould 5000 Plotter Control unit
  - One Gould 5000 Plotter printer

- o IBM 360 Modle 20
  - One IBM 2020-2 Processing unit
  - One IBM 1403 Printer
  - One IBM 2560 Multifunction Card Machine
  - One IBM 2415 Magnetic Tape unit and Controller

- o PDP Units
  - Two PDP-11 Computers
  - Two PDP Tape units
  - One LA36 DECwriter teleprinter
  - Two LT33 Teletypes

- o GIMS PDP Unit
  - One PDP-11/45 Computer
  - One DEC LP02 Line Printer
  - One DEC RP04 Disk Drive
  - Three BA11F Expander Boxes
  - One DEC RK05 Disk Drive
  - One DEC TU16 Magnetic Tape Drive
  - One DEC TC11 Tape Controller
  - One DEC TU56 Tape Drive
  - One DEC PC04/05 Paper Tape Unit

ATTACHMENT D

SPECIAL CENTER

CURRENT EQUIPMENT LIST

(A) CPU's

- o IBM 360/65-1
  - -One IBM 2065 Processing Unit
  - -Two IBM 2365-2 Processor Storage Units
  - -One IBM 2860-3 Selector Channel
  - -One IBM 2870-1 Byte Multiplexor Channel
  - -Two CDC 23065 Core Memory Systems
- o IBM 370/158 Red
  - -One IBM 3158K Processing Unit
  - -One IBM 3213 Printer
- o IBM 370/158 Blue
  - -One IBM 3158K Processing Unit
  - -One IBM 3213 Printer

(B) DISK UNITS

- o Two IBM 3333-2 Disk Storage and Control Units
- o Six IBM 3333-1 Disk Storage and Control Units
- o Eighteen IBM 3333-I Disk Storage Units
- o Six IBM 3330-II Disk Storage Units
- o Five Calcomp CD14 Controllers
- o Twenty Calcomp CD22 Disk Drives

(C) TAPE DEVICES

- o Six IBM 3803 Tape Control Units
- o Fourteen IBM 3420-7 Magnetic Tape Units
- o Eight IBM 3420-6 Magnetic Tape Units

(D) I/O DEVICES

- o Three IBM 1403 Printers
- o Three IBM 2540 Card Reader/Punch Units
- o Three IBM 2821-1 Control Units
- o One IBM 3211 Printer
- o One IBM 3811 Printer Control Units
- o Two IBM 029 Key Punches

(E) DRUMS

- o One IBM 2301 Drum Storage Unit
- o One IBM 2820 Storage Control Unit

(F) SWITCHING UNITS

- o Two IBM 2914 Switching Units
- o One T-Bar 3916 Switching Unit

(G) TERMINALS

- o Two IBM 2702 Control Units
- o Three IBM 2741 Printers
- o Six IBM 3272 Control Units
- o One IBM 3288 Printer
- o One Comten 3670 Communication Control Module
- o One Comten Teletype Console
- o Two Memorex 1270 Terminal Control Units

ATTACHMENT E

Ruffing Center Hardware Order List

CPUs

New Processor No. 1

New Processor No. 2

Switches

T-Bar 8 by 16 Switching unit

Fixed Head Storage (Drums)

2 IBM 2835s

4 IBM 2305s

Tape

MES for 8 1600/800 tape drives tc 6250/1600

1 IBM 3803-2 tape controller

MES 5 IBM 3803 controllers tc the channel interface

MES to make 6250/SIM tape pool 4 by 16

Disk (DASD)

4 3830 type controllers for 3350s

32 3350 type device (4 A2fs, 8 B2Fs, 4C2Fs)

3 IBM 3830-2 controlers (4 channel interface)

MES IBM 3330 from Mod 1 to Mod 11

MES IBM 3330 from positicn 4 to position 3

MES IBM 3830-2 from 1 channel interface to 2 channel interface

MES IBM 3830-2 from 2 channel interface to 4 channel

interface

1 IBM 3333

6 CDC CAUs with 2 control and string switch features

5 Kits for CDC 38302 tc 2K memory expansicn

4 Kits for CDC CAU string switch capability

ATTACHMENT E

Special Center Hardware Order List

CPUs

IBM 370/158 (Red & Blue) from mod 1 to mod 3

Attached processors for Red & Blue 158s

5th channel for Red & Blue 158s

2 Megabytes of memory for each 158 (4 megabytes total)

Disk (DASD)

MES Red & Blue ISCs for 3350s

24 3350 type devices (3 A2Fs, 6 B2Fs, 3 C2Fs)

Communications

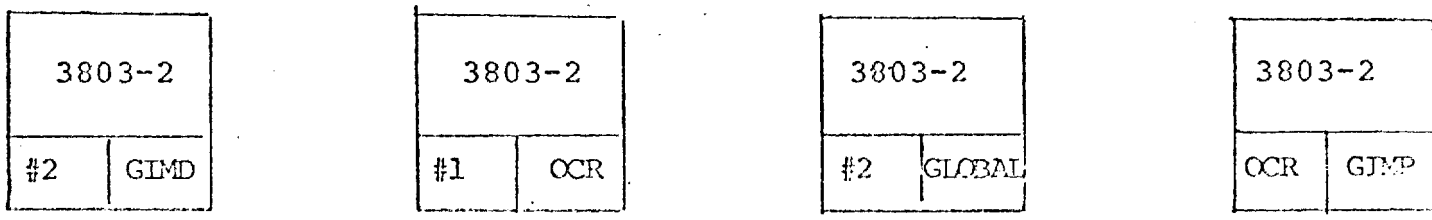
1 COMTEN 3670

ATTACHMENT F

RUFFING CENTER TAPE POOL

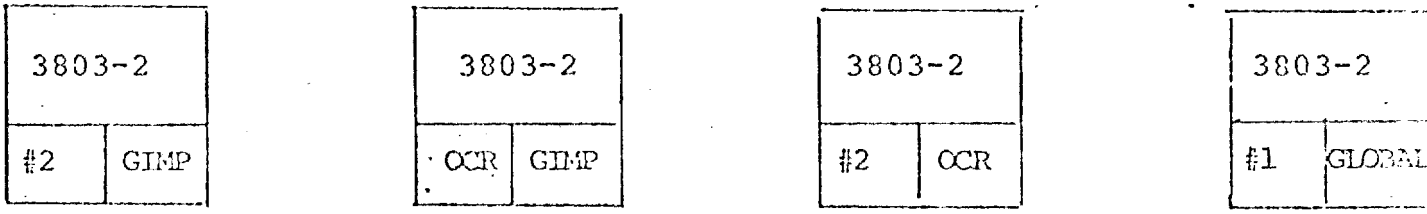
EX - 16 DRIVES (2 7-Track)

#2 OP CHAN
OCR OP CHAN



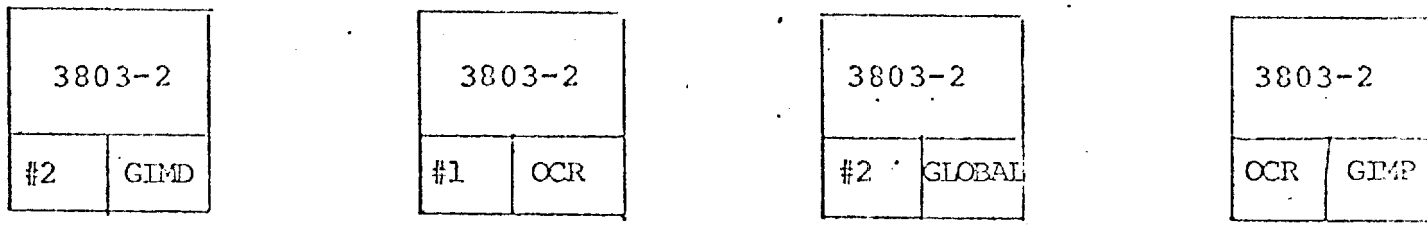
DX - 16 DRIVES (8 6250-BPI)

#2 OP CHAN
OCR OP CHAN
GIMP OP CHAN



FX - 16 DRIVES (8 6250-BPI)

#2 OP CHAN
OCR OP CHAN



TOTAL DRIVES 48

#1 (VM)	48
#2 (LOCAL)	48
1681 (GIMP)	48
1682 (GLOBAL)	48
1683 (OCR)	48
195 (GIMD)	32

REQUIRED CHANGES:

- MES EIGHT DX DRIVES
- ADD 3803-2
- MES FIVE CNTLS TO TWO CHAN INTERFACE

ATTACHMENT G

RUFFING AND SPECIAL CENTER

DISK STORAGE REQUIREMENTS

Through FY80

Approved For Release 2000/05/15 : CIA-RDP80-01003A000100130001-0

This Attachment describes the plan developed by the Engineering Division for existing and projected disk space (DASD) requirements in the Ruffing and Special Centers for fiscal years 1978,79 and 80. Some minor modifications to this plan can be expected because exact configurations will depend on the characteristics of new equipment ordered through the RFP process. For this reason, the exact controller/disk configurations are not given and requirements are cited in terms of megabytes of storage.

The implementation of this plan will fullfill all known disk space requirements through at least FY80 with the exception of the CAMS requirement. Planning for CAMS disk space must be postponed until clarification of CAMS requirements can be obtained.

This plan was developed using the following guidelines:

A) Provide a plan compatable with current physical space constraints.

B) Provide for improved avaliability and reliability through multiple controller and alternate channel path configurations whenever possible.

C) Satisfy requirements for additional DASD space by ordering only the new Winchester technology equipment (3350 type drives).

D) Provide flexibility in the plan in the event that mass storage is implemented in FY79 or 80.

In this plan the major applications are categorized as having either high or low I/O rates. This was done under the assumption that the high I/O rate applications would be assigned drives with the smallest amount of data under one head, and the low I/O rate applications would be placed on drives with high capacity. Previously this was not an important consideration because the selection of disk drives was not as great as it is now. For example, today we can select a 2314 type drive with 30 MBS of storage or go to the extreme of a 3350 type drive with 400 MBS of storage. This approach is a coarse cut at the problem and will be refined when more measurement information is avaliable and more experience is gained with the new large capacity drives.

This plan requires 146 3330 Mod 1 drives, 76 3330 Mod 11 drives, 56 3350 type drives and 116 2314 drives (80 single and 36

dual density). With the exception of the 3350 type drives which will be procured through the RFP process, all of the drives in this plan are presently installed.

The FY78 phase of this plan calls for the installation of 24 3350 type drives in the Special Center to meet DDO/ISS requirements. This installation will free 24 3330 mod 1 drives and 16 3330 mod 11 drives from the DDO/ISS configuration to be used to fulfill intermediate requirements in the Ruffing Center. In FY79, 32 more 3350 type drives will be installed in the Ruffing Center to be used for VM and SHARE. By the end of FY79 all DASD requirements through FY80 will have been satisfied in both Centers.

The following two Charts list the major aplication configurations considered in this plan and the amount of disk space required in terms of megabytes of storage (MBS). The final section of this Attachment provides a brief discussion of the DASD configurations cited in these Charts.

RUFFING CENTER REQUIREMENTS

APPLICATION	PRESENT MB	FY78 MB	FY79 MB	I/O Rate
System (MVS) 158-1	800	800	800	H
System (MVT) 65-2	240			H
System (MVS) 168-1		800	1600	H
System (MVS) 168-2	800	1600	1600	H
System (MVS) 168-3	800	1600	1600	H
System (MVT) 195	600	600	600	H
System (VM) NEW-1		800	1600	H
System (MVS) NEW 2			1600	H
VM Mini Disk	4000	4800	5600	I
SHARE	3200	4000	7200	I
GIMPROD	1280	1840	3200	I
SPOOL (ASP/JES3)	600	1200	1200	I
OCR	4800	4800	5600	L
SANCA	240	240	240	I
GIMDEV	720	960	1200	L
COMMON	4800	4800	4800	H
HYDRA	240	240	240	L
TADS	960	1200	1200	L
3330 Setup	600			I
2314 Setup	480	480	480	L
	25160	30760	40360	

SPECIAL CENTER REQUIREMENTS

APPLICATION	PRESENT MB	FY78 MB	FY79 MB	I/C Rate
System (MVS) 158R	700	800	800	H
System (MVS) 158B	700	800	800	H
NIPS	400	500	500	I
STAR	3400	4800	4800	I
DEV	600	800	800	I
CICS	200	300	300	H
COMMON(1)	1200	1300	1300	I
SPARE(2)	800	300	300	I
CAMS	720	720	720	I
SYSTEMS 65-1	480	480	480	H
	9200	10800	10800	

(1) Common includes: sort space, libraries, and several small applications.
(2) In order to achieve the level of uptime required for on-line systems, one spare per string is provided.

III CONFIGURATION REQUIREMENTS

1. Ruffing Center

1.1 System Space 158

The present requirement is 800 MBS. This requirement is not expected to increase in the next two years. A single string of 3330 Mod-1's (8) will meet this requirement and provide a spare. The string is connected to a 3830 single channel controller, no string switching or dual channel access will be used.

1.2 System Space (168-1,168-2,168-3,NEW-2) MVS

The present system space on these systems is 800 MBs each. Due to MVS the system space requirement for each system will increase to 1600 MBS.

The proposed configuration to meet this requirement is 2 strings of 3330 mod-1's (16 drives), this will provide for two spares. The 3330 strings will be connected to dual channel controllers string switched providing increased avaliability and flexibility.

1.3 System space 360/195

The system space for the 195 will not change. The present string of six 3330 mod-1's will meet the requirement for this system.

1.4 VM System space (NEW-1)

The present requirement for VM is 600 MBS. System space is currently provided on the VM minidisk configuration. In order for NEW-1 to meet the expanding requirements of VM the system space will be increased to 1600 MBS.

To meet this requirement two strings of 3330 Mod-1's will be provided. The 3330's will be connected to a dual channel controller string switched. This configuration will provide for increased avaliability and flexibility.

1.5 VM Minidisk

The present requirement for minidisk storage is 3400 MBS. The requirement thru FY80 is 5600 MBS. Minidisk storage has a fairly low I/O rate and is suited to high density Winchester

technology. To meet the minidisk requirement, 3350 type drives will be supplied.

The configuration propcsed fcr this requirement is 2 strings of 3350 type drives and a string of 3330 mod-1s connected to 2 dual channel controllers. Each string of 3350s will consist of one A2F, two B2F and one C2F type drive. No spares will be provided for the 3350s due to the high reliability of Winchester technology.

1.6 SHARE

SHARE space is the largest growth area. This increase is provided to reduce setups to a minimum, eliminate small data sets on tape and for growth in user requirements. The present requirement is 3200 MBS. The prcjected requirement is 7200 MBS.

To meet the SHARE requirement two strings of 3350 type drives 1 string of 3330 mod-11 type drives and 1 string of 3330 mod-1 type drives will be provided. These will be ccnnected tc four channel controllers string switched. Each 3350 string will consist of one A2F,two B2F and one C2F type drive. No spares will be provided for 3350s.

1.7 GIMPROD

The present GIMPROD requirement is 1280 MBS. During the next two years GIMPROD is expected tc have a requirement for 3200 MBS.

To meet this requirement two strings of 3330 mod-11's will be provided. Two dual access controllers will be used and string switched to provide increased avaliability and flexibility.

1.8 SPOOLS(ASP/JES3)

The present SPOOL requirement is 600 MBS. Due to the larger requirement of MVS, SPOOL space will be increased to 1200 MBS.

The SPOOL disk system must be accessable by all CPU's operating under MVS. To meet this requirement two strings of 3330 mod-1's totaling 12 drives will be provided. Two 4 channel ccntrollers string switched will meet the requirement for access to all MVS CPU's.

1.9 OCR

The space requirement fcr this system is 5600 MBS. To meet

this requirement 28 3330 mod-11 drives will be provided. They will be connected to dual channel controllers and string switched for maximum avaliability and flexibility.

1.10 SANCA

SANCA is a stable system and no increase in the present requirement of 240 MBS is expected.

The present string of 8 2314 drives connected to a single channel controller will satisfy this requirement and provide 2 spares.

1.11 GIMDEV

GIMDEV currently requires 2314 type drives since it is run on the 360/65. The projected requirement is 1200 MBS. This increase can be met by using 2 strings of 2314 drives from the current GIM Production configuration.

1.12. COMMON

The COMMON space requirement is 4800 MBS. The final configuration will consist of 2 strings of 3330 mod-11 and 2 strings of 3330 mod-1 type drives. Four 4 channel controllers and the DAF feature will be employed in this configuration to insure both avaliability and throughput.

1.13 HYDRA

HYDRA is a stable system, so there is no foreseeable increase in the on-line storage requirement. The present string of four dual density 2314 drives will meet the HYDRA requirement.

1.14 TADS

The present TADS storage requirment is 960 MBS. The expected growth in TADS will bring the requirement up to 1200 MBS. After the release of the 65-2, a spare string of 2314s will be avaliable to meet this demand.

1.17 2314 Setup

Two strings of 2314 drives will be provided for setup. This is a minimum configuration for redunancy.

1.18 360/65-2 System (Ruffing center)

The requirement for this system is 240 MBS (one string of 2314 drives). The 65-2 will be released by the end of FY78 at which time this string can be re-utilized.

2. Special Center

The major DDO/ISS aplications considered in the Special Center disk space allocation are: NIPS, STAR, CICS, DEVELOPMENT, SPARE, COMMON and SYSTEM. Unlike the Ruffing Center the major applications are not seperated on dedicated disk drives, but are distributed over the entire configuration. Because of this the DDO/ISS disk space requirement is treated to as one requirement.

The present space requirement for DDO/ISS is 8000 MBS. The present configuration includes six strings of 3330 Mod-1s (48 drives) and two strings of 3330 Mod-11s (16 drives). Each string has one spare which is included in the total count.

The space requirement through FY79 is 9,600 MBS. The proposed configuration to meet this requirement consists of 3 strings of 3350 type drives (24) and 3 strings of 3330 MOd-1s. All drives will be string switched and accessable by both CPU's.

2.2 CAMS

The present requirement for CAMS is 1200 MB. The operating system requires 240 MBS, with the remaining 960 MBS used for CAMS data bases. Since the CAMS requirement is not known at this time no requirement increases have been planned for this service.